REMARKS

A. Request for Reconsideration

Applicants have carefully considered the matters raised by the Examiner in the outstanding Office Action but remain of the position that patentable subject matter is present. Applicants respectfully request reconsideration of the Examiner's position based on the amendments to the specification, the amendments to the claims, and the following remarks.

B. The Invention

The present invention is directed to an electrophotographic photoreceptor that has stable charging, stable sensitivity, reduced variation in charging potential or residual potential, prevents the formation of image defects, and has high image density, all under high temperature and high humidity or low temperature and low humidity.

In one of the novel aspects of the invention, the photoreceptor has an interlayer with an N-type semiconductive particle having one or more transition metals. In another novel aspect of the invention, the total amount of the transition metals is from 100 ppm to 2.0% by mass.

In yet another novel aspect of the invention, the interlayer is composed of a metal oxide particle having a niobium element and a silicon atom. In a further novel aspect of the invention, the niobium element and the silicon atom are in a ratio represented by formula (1) in a bond energy spectrum measured by an X-ray photoelectron spectroscopy.

C. Claim Status and Amendments

Claims 1, 3-11, 13-21, and 23-29 are presented for further prosecution. Claims 27-29 have been added by this amendment.

Claim 1 has been amended to replace "at least one" transition metal with "one or more" transition metals. New matter has not been added.

Claim 1 has also been amended to include the limitations of claim 2. Claim 2 has been cancelled and claims 3-7, 10, and 13 have been amended to be dependent on claim 1.

Claim 4 has been amended to replace "lead oxide" with "zinc oxide". Support for this amendment can be found in line 19 on page 15 of the application which identifies the compound ZnO.

Claims 5 and 6 have been amended as a result of the amendment to claim 1. New matter has not been added.

Claim 10 has been amended as a result of the amendment to claim 1.

Claims 14 and 15 have been amended to correct minor typographical errors.

Claim 25 has been amended to delete the inadvertent reference to claim 26.

New independent claim 27 has been added to recover the subject matter that had been deleted from claim 1 by this amendment. In addition, new claim 27 recites that the metal oxide particle comprises a niobium element. Support for new claim 27 can be found in original claim 1 and in par. 1 on page 33 of the application.

Claim 28 has been added to recite that the metal oxide particle comprises titanium oxide. Support for this amendment can be found in par. 2 on page 15.

New claim 29 has been added to recite that the metal oxide particle comprises anatase-type titanium oxide. Support for this amendment can be found in par. 3 on page 15 of the application.

D. Specification Amendments

Several paragraphs beginning on pages 11, 15, and 29 have been amended to correct minor typographical errors. In addition, several paragraphs beginning on pages 95-101 have been amended to replace "A" with "B" to reflect the section headings that describe pigments "B1-B8" on pages 95-101. Tables 5 and 6

of the application have been amended to reflect this correction as well. Also, Tables 1 and 2 have been amended to replace "within prevention" with "within invention". New matter has not been added.

E. Claim Objections

Claims 14 and 15 had been objected to for misspelling the word "resin", and claim 26 had been objected to for being listed twice. Correction has been made herein.

F. Claim Rejections

Claims 1-26 had been rejected as being anticipated by or unpatentable over either Aizawa (U.S. 5,744,271) or Hamaguchi (U.S. 2001/0044063). Claims 1-26 had also been rejected as being unpatentable over either Aizawa or Hamaguchi in combination with Ohno (U.S. 4,804,606).

Aizawa and Hamaguchi had each been cited to teach an interlayer containing anatase-type titanium oxide particles treated with silicon. Ohno had been cited to teach an interlayer that includes niobium.

1. Aizawa and Hamaguchi do not teach or suggest an N-type semiconductive particle comprising a transition metal

Applicants have amended claim 1 to recite that the interlayer includes an N-type semiconductive particle having one or more transition metals. As explained in par. 1 on page 29 of the application, the N-type semiconductive particle can be a pigment such as titanium oxide. In addition, par. 1 on page 29 further explains that such a titanium oxide pigment includes a transition metal. Thus, claim 1 of the application recites two different limitations, the first being an N-type semiconductive particle, and the second being that the N-type semiconductive particle comprises one or more transition metals.

Aizawa and Hamaguchi do not teach or suggest an N-type semiconductive particle comprising a transition metal as recited in claim 1. Aizawa teaches anatase-type titanium dioxide particles, but these particles do not include a transition metal (see col. 2, lines 64-66 of Aizawa). Similarly, Hamaguchi teaches anatase-type titanium oxide particles without a transition metal (see par. 43 of Hamaguchi). Thus, Aizawa and Hamaguchi do not anticipate claim 1, because Aizawa and Hamaguchi do not teach an N-type particle comprising a transition metal. Applicants therefore respectfully submit that the present invention is patentable over Aizawa and Hamaguchi.

In addition to the above, the silicon treated particle in col. 3, lines 25-27 of Aizawa and par. 44 of Hamaguchi does not anticipate claim 1, because silicon is not a transition metal.

2. Aizawa and Hamaguchi do not teach or suggest the criticality of the 100 ppm to 2.0% by mass range of claim 1

Claim 1 recites an N-semiconductive particle having one or more transition metals, wherein the total amount of the transition metals is from 100 ppm to 2.0% by mass.

Initially, Applicants note that Aizawa and Hamaguchi do not teach or suggest the 100 ppm to 2.0% by mass of the transition metals of claim 1. Thus, Aizawa and Hamaguchi do not anticipate claim 1.

Second, Applicants submit that the claimed range is not obvious based on the teachings of Aizawa and Hamaguchi based on the criticality demonstrated in Tables 1-3 on pages 72-85 of the application.

As seen when viewing Table 2 and page 76, photoreceptor 13 contains 300 ppm of N-type particle A3, photoreceptor 19 contains 1.8% by mass of N-type particle A4, photoreceptor 20 contains 70 ppm of N-type particle A5, and photoreceptor 21 contains 2.2% by mass of N-type particle A6.

As shown in Table 3, photoreceptor 13 (300 ppm of particle A3) is superior to photoreceptor 20 (70 ppm of particle A5) in terms of image density, fog, black spots, and sharpness. Thus, comparing photoreceptor 13 with photoreceptor 20 demonstrates the criticality of the 100 ppm lower limit of claim 1.

A comparison between photoreceptor 19 and photoreceptor 21 demonstrates the criticality of the 2.0% by mass upper limit of the range of claim 1. As shown in Table 3, photoreceptor 19 (1.8% by mass of particle A4) is superior to photoreceptor 21 (2.2% by mass of particle A6) in terms of image density, fog, black spots and sharpness.

As summarized above, Table 3 demonstrates the criticality of the 100 ppm to 2.0% by mass range of the transition metals of claim 1. Applicants respectfully submit that the present invention is not obvious over the teachings of Aizawa and Hamaguchi, because Aizawa and Hamaguchi do not teach or suggest the claimed range, and because Aizawa and Hamaguchi do not teach or suggest the criticality of the claimed range.

3. Aizawa and Hamaguchi do not teach or suggest the niobium element of claim 27

Claim 27 recites that the metal oxide particle has a niobium element.

Aizawa and Hamaguchi do not teach or suggest a metal oxide particle having a niobium element. It is therefore respectfully submitted that independent claim 27 is patentable over the teachings of Aizawa and Hamaguchi.

4. It would not be obvious to combine the teachings of either Aizawa or Hamaguchi with Ohno

The Examiner stated that it would be obvious to add the niobium compound in the interlayer of Ohno to either the interlayer of Aizawa or the interlayer of Hamaguchi. Applicants respectfully disagree.

First, Aizawa teaches an interlayer containing metal oxide particles dispersed in a binder resin (see col. 2, lines 64-66). Similarly, Hamaguchi teaches metal oxide particles dispersed in a binder resin (see par. 34 of Hamaguchi).

In contrast to the dispersions of Aizawa and Hamaguchi, the niobium interlayer of Ohno is created by a sputtering process or a vapor deposition process (col. 3, lines 51-56 and col. 5, lines 35-36 of Ohno). Thus, Ohno teaches a sputtered or vapor deposited interlayer, while Aizawa and Hamaguchi teach a dispersed interlayer. A skilled person in the art would not employ steps or components from the sputtering or vapor deposition process of Ohno in the dispersion processes of Aizawa or Hamaguchi. Applicants therefore believe that it would not be

obvious to combine the teachings of Ohno with either Aizawa or Hamaguchi.

Second, claim 27 recites a metal oxide particle comprising a niobium element. As explained in par. 1 on page 33 of the application, the niobium element can be incorporated into the metal oxide particle to stabilize the particle. A combination of Ohno with either Aizawa or Hamaguchi does not teach or suggest incorporating a niobium element into a metal oxide particle. As a result, it is respectfully submitted that a combination of the teachings of Ohno with either Aizawa or Hamaguchi does not teach or suggest claim 27.

5. Ohno teaches away from an interlayer having a metal oxide particle

In lines 30-36 of col. 3 of Ohno, Ohno explains that an interlayer having an insulating oxide film is not appropriate due to its high resistance. Thus, Ohno teaches away from an interlayer having a metal oxide particle as recited in claim 27.

Applicants therefore respectfully submit that it would not be obvious to combine the teachings of Ohno with either Aizawa or Hamaguchi, because Ohno teaches away from an interlayer having a metal oxide particle.

6. The criticality of the range of formula (1) of claim 27 is not taught or suggested by the cited references

Claim 27 recites that the metal oxide particle comprises a niobium element and a silicon atom in a bond energy spectrum at a ratio of $0.02 \leq Si/M \leq 0.55$.

First, Applicants note that Aizawa, Hamaguchi and Ohno do not teach or suggest the 100 ppm to 2.0% by mass range of the transition metals of claim 1. Thus, Aizawa, Hamaguchi and Ohno do not anticipate claim 1.

Second, Applicants submit that the claimed range is not obvious based on the teachings of Aizawa, Hamaguchi and Ohno due to the showing of criticality in Tables 4-7 on pages 94-109 of the application.

As seen when viewing Table 5 and pages 95-101, photoreceptor 11 contains particles B2 having an Si/Ti ratio of 0.510, photoreceptor 20 contains particles B5 having an Si/Ti ratio of 0.020, photoreceptor 22 contains particles B7 having an Si/Ti ratio of 0.010, and photoreceptor 23 contains particles B8 having an Si/Ti ratio of 0.565.

As shown in Table 7, photoreceptor 20 (ratio of 0.020) is superior to photoreceptor 22 (ratio of 0.010) in terms of fog, black spots, moiré, and sharpness. Thus, comparing photoreceptor 20 with photoreceptor 22 demonstrates the criticality of the 0.020 lower limit of formula (1) of claim 27.

The 0.550 upper limit of formula (1) of claim 27 is demonstrated by comparing photoreceptor 11 with photoreceptor 23. As shown in Table 7, photoreceptor 11 (ratio of 0.510) is superior to photoreceptor 23 (ration of 0.565) in terms of image density, fog, and sharpness. Applicants therefore respectfully submit that the criticality of the upper limit of formula (1) of claim 27 is demonstrating by making this comparison.

Applicants respectfully submit that the present invention is not obvious over a combination of Aizawa, Hamaguchi and Ohno, because these references do not teach or suggest the $0.02 \leq Si/M \leq 0.55$ range of formula (1) of claim 27, and because the cited references do not teach or suggest the criticality of the range of formula 1 of claim 27 as demonstrated in Tables 4-7 of the application.

G. Conclusion

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance and such action is respectfully requested. Should any extensions of time or fees be necessary in order to maintain this Application in pending

condition, appropriate requests are hereby made and authorization is given to debit Account # 02-2275.

Respectfully submitted,

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